CLAIMS

1. Method of determining the local contrast at the level of each pixel (p_C) of an array (M_p) of photosensitive pixels disposed in at least one dimension (x, y), in which method, during respective successive image capture cycles, a signal (L_C) is generated that is representative of the local luminance captured by each pixel, the luminance signals (L_{pn}, $L_{p(n+1)}$, $L_{p(n-1)}$) being integrated values of the luminance values captured by respective pixels (p_C, p_L, p_R, p_A, p_B),

which method is characterized in that it consists in sampling the integrated values of the signals representing the luminances captured by the pixels (p_L, p_R, p_A, p_B) adjacent a pixel concerned (p_C) at a time in said cycle at which the integrated value of the luminance captured by said pixel concerned (p_C) becomes equal to a predetermined reference value (V_{ref}, V_{WHITE}), and determining the local contrast of said pixel concerned (p_C) on the basis of the values sampled in this way.

2. Method according to claim 1, characterized in that said reference value (V_{ref}) is chosen as an intermediate value of the difference between a maximum white level value (NB) and a maximum black level value (NN) liable to be captured by said pixels (p_C, p_L, p_R, p_A, p_B), said intermediate value preferably being equal to half this difference.

3. Method according to claim 2, characterized in that it consists in calculating the local contrast by applying to said at least one dimension of said array the following expression:

$$C_{pn} = \frac{L_{p(n-1)} - L_{p(n+1)}}{L_{pn}}$$

in which

C_{pn} is the local contrast calculated for said cycle of a pixel of rank n (p_c) in the row of the array oriented along said dimension,

L_{pn} is a signal representing the luminance captured by the pixel of rank n (p_c),

$L_{p(n-1)}$ is a signal representing the luminance captured by the preceding adjacent pixel in said row of rank n-1 (p_L), and

$L_{p(n+1)}$ is a signal representing the luminance captured by the next adjacent pixel in said row of rank n+1 (p_R).

4. Method according to either claim 2 or claim 3, characterized in that the integrated values of the signals representing the luminances captured by said adjacent pixels (p_L, p_R, p_A, p_B) are accumulated in respective capacitors (14_R, 14_L, 14_A, 14_B) at the time at which the integrated value of the pixel concerned (p_C) reaches said reference value (V_{ref}), said capacitors providing the values necessary for the

calculation of the contrast.

5. Method according to any one of claims 2 to 4, characterized in that, if said array takes the form of a matrix (M_p) of pixels with two dimensions, the contrast calculation is effected on the basis of the following equations:

$$C_x = L_L - L_R$$

and

$$C_y = L_A - L_B$$

in which:

- C_x is the local contrast component in the x direction of the matrix,
- C_y is the local contrast component in the y direction of the matrix,
- L_L, L_R are signals representative of the luminances captured by the respective pixels (p_L, p_R) adjacent the pixel concerned (p_C) in the x direction,
- L_A, L_B are signals representative of the luminances captured by the respective pixels (p_A, p_B) adjacent the pixel concerned (p_C) in the y direction,

said expressions being used to calculate the components of the contrast vector at the level of said pixel concerned (p_C).

6. Method according to claims 4 and 5, characterized in that each pair of accumulated values ($V_L(t_{ref})$, $V_R(t_{ref})$ and $V_A(t_{ref})$, $V_B(t_{ref})$) belonging to said x and y directions, respectively, is subjected to four-quadrant analog multiplication by a cosinusoidal signal and a sinusoidal signal of the same frequency and amplitude as said cosinusoidal signal, respectively, and in that the results (I_x, I_y) of the corresponding multiplications are added to form the modulus and the phase of the local contrast vector corresponding to said pixel concerned (p_C).

7. Method according to claim 1, characterized in that said reference value is chosen to be a maximum white level value (V_{WHITE}) liable to be captured by said pixels (p_C, p_L, p_R, p_A, p_B).

8. Method according to claim 7, characterized in that it consists, during each of said image capture cycles, in measuring the times at which, in a group of pixels made up of the pixel concerned and its adjacent pixels (p_C, p_L, p_R, p_A, p_B), the integrated values of the luminance values captured by those pixels reach said white level value (V_{WHITE}) and taking as the value of the local contrast the integrated value for the pixel concerned when the first of the adjacent pixels (p_R, p_L, p_A, p_B) reaches said white level value.

9. Method according to claim 8, characterized in that it consists in generating pulse signals (S_L, S_R, S_B, S_A) coding each of said times and effecting a

logical combination of said pulse signals (S_L, S_R, S_B, S_A) to determine the orientation of said local contrast as a function of the order in which the integrated values of the pixels of said groups of pixels (p_C, p_L, p_R, p_A, p_B) reach said white level value (V_{WHITE}).

10. Method according to claim 9, characterized in that the order of said times is coded on three bits (B_0, B_1, B_2) and in that the orientation of said contrast value is determined in octants of the trigonometrical circle.

11. Method according to claim 8, characterized in that it consists in taking as a second component of the contrast the integrated value for the pixel concerned when the second of said integrated values for the adjacent pixels (p_R, p_L, p_A, p_B) reaches said white level.

12. Sensor for determining the local contrast of an observed scene by detecting the luminance emanating from that scene using an array comprising at least one row of pixels disposed in at least one dimension of said array and using the method according to any one of claims 1 to 11, this sensor comprising in each pixel (p_C) a photosensitive circuit (ph) supplying a signal representing the local luminance (V_{ci}) emanating from the image and captured by said pixel in the form of an integration value ($V_p(t)$),

which sensor is characterized in that there is provided in each pixel a comparator (10) for comparing said signal representing the local luminance to a reference value (V_{ref}, V_{WHITE}) and supplying a command signal when said luminance signal is equal to said reference value.

13. Sensor according to claim 12 for implementing the method according to any one of claims 2 to 6, characterized in that it comprises a source delivering a reference value (V_{ref}) that is equal to an intermediate value of the difference between a maximum white level value (NB) and a maximum black level value (NN) liable to be captured by said pixels, this value preferably being half this said value.

14. Sensor according to claim 13, characterized in that it comprises a local contrast calculation circuit (15) and means (12_R, 12_L, 12_A, 12_B, 14_R, 14_L, 14_A, 14_B) for applying to said calculation circuit (15), in response to said command signal, the signals representing the local luminance of the pixels (p_L, p_R, p_A, p_B) immediately adjacent the pixels concerned (p_C).

15. Sensor according to claim 14, characterized in that said signals representing the local luminance ($V_p(t)$, $V_L(t)$, $V_R(t)$, $V_A(t)$, $V_B(t)$) take the form of voltages.

16. Sensor according to claim 15, characterized in that said means for applying to said calculation circuit (15) said signals representing the local luminance comprise a set of capacitors (14_R, 14_L, 14_A, 14_B) for storing the voltages ($V_L(t)$, $V_R(t)$,

$V_A(t)$, $V_B(t)$) supplied by said immediately adjacent pixels while said integrated value of said pixel concerned evolves towards the reference value (V_{ref}).

17. Sensor according to claim 16 for implementing the method according to claim 6, characterized in that it comprises for each of said directions (x, y) analog four-quadrant multiplier means (18a, 18b) connected to multiply the respective voltages stored in said capacitors with sinusoidal voltages and in that an adder (22) is provided for summing the result of the multiplications effected by said multiplier means in order to deduce therefrom the local contrast vector of said pixel concerned.

18. Sensor according to claim 17, characterized in that said analog multiplier means comprise for each of said directions (x, y) a multiplier (18a, 18b) implemented by means of transistors (M1 to M6), the stray capacitances of the transistors (M1 to M4) provided at the inputs of said multipliers forming said respective storage capacitors (14_R, 14_L, 14_A, 14_B).

19. Sensor according to claim 12 for implementing the method according to any one of claims 7 to 11, characterized in that it comprises a source delivering said reference value (V_{WHITE}) that is equal to a maximum white level value liable to be captured by said pixels (p_C, p_L, p_R, p_A, p_B).

20. Sensor according to claim 19, characterized in that it comprises in each pixel (p_C) means for delivering a binary signal (S_L, S_R, S_B, S_A) when, during each of said cycles, said integrated value reaches said white value (V_{WHITE}), OR logic means (29) connected to receive from said adjacent pixels (p_L, p_R, p_A, p_B) the binary signal (S_L, S_R, S_B, S_A) delivered thereby, where applicable, and logical combination means (34) for assigning an orientation value to the contrast value captured by the pixel concerned as a function of the binary state of each of said binary signals (S_L, S_R, S_B, S_A).

21. Sensor according to claim 19, characterized in that when the first of the signals (S_L, S_R, S_B, S_A) goes high, the integrated value for the pixel concerned is stored in a capacitor.

22. Sensor according to claim 20, characterized in that it contains a second capacitor in which is stored the integrated voltage of the pixel concerned when the second of said binary signals (S_L, S_R, S_B, S_A) goes high.